UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southwest Region
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OCT 26 2000

F/SWR4: MH

Mr. John F. Davis
Regional Resources Manager
U. S. Bureau of Reclamation
2800 Cottage Way
Sacramento, California 95825-1898

Dear Mr. Davis:

This document transmits the National Marine Fisheries Service's (NMFS) Biological Opinion based on NMFS' review of the proposed fish screen and fish bypass facility at the Banta-Carbona Irrigation District canal near Vernalis, California, and its effects on the threatened Central Valley evolutionarily significant unit (ESU) of steelhead (*Oncorhynchus mykiss*) and its critical habitat in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). This document also transmits NMFS' essential fish habitat (EFH) Conservation Recommendations for fall-run chinook salmon (*Oncorhynchus tshawytscha*) as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) as amended (16 U.S.C. 1801 et seq.).

The Biological Opinion and EFH Conservation Recommendations are based on written descriptions of the fish screen project provided in the October 1999 Biological Assessment, the January 2000 Draft Environmental Assessment and several conversations between Mr. Mark Helvey of NMFS, Mr. William O'Leary of the Bureau of Reclamation (BOR), NMFS hydraulic engineers and a review of the ecological literature on steelhead. A complete administrative record of this consultation is on file in the NMFS' Santa Rosa office.

Please note that NMFS has chosen to include all five of the Reasonable and Prudent Measures and their respective Terms and Conditions listed in the Incidental Take Statement prepared for the Central Valley Steelhead ESU as its EFH Conservation Recommendations for chinook salmon. In addition, one other EFH Conservation Recommendations has been included.

Section 305(b)(4)(B) of the MSFCMA requires BOR to provide NMFS a detailed written response to these EFH Conservation Recommendations, including a description of measures adopted by BOR for avoiding, mitigating, or offsetting the impact of the project on EFH within 30 days after receiving this letter. In the case of a response that is inconsistent with NMFS' recommendations, BOR must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(j)). If unable to complete a final response within 30 days, BOR may provide NMFS an interim written response within 30 days before submitting its final response.

If you have any questions concerning this Biological Opinion or EFH Conservation Recommendations, please contact Michael Aceituno at (916) 498-6498.

Sincerely,

Rodney R McInnis

for Rebecca Lent, Ph.D.
Regional Administrator

Enclosure

cc: Jim Lone, PFMC
Robert Hight, CDFG

Banta-Carbona Irrigation District
Fish Screen Project

BIOLOGICAL OPINION
(**Endangered Species Act -Section 7 Consultation**)

and

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS
(**Magnuson-Stevens Fishery Conservation and Management Act - EFH Consultation**)

Endangered Species Act -Section 7 Consultation

BIOLOGICAL OPINION

Agency: U.S. Bureau of Reclamation

Activity: Proposed Fish Screen and Fish Bypass Facility at the Banta-Carbona Irrigation District Canal

Consultation Conducted By: National Marine Fisheries Service, Southwest Region.

Date Issued: October 26, 2000 .

I. INTRODUCTION

The Banta-Carbona Irrigation District (BCID) proposes to provide fish protection at a water diversion canal it owns and operates on the San Joaquin River at River Mile 63.5 in the Central Valley of California. The BCID diversion canal has been identified as having priority for fish-screen installation in the California Department of Fish & Game's (CDFG) Fish Screen Action Plan (CDFG, 1994) and by the U. S. Fish and Wildlife Service's (USFWS) Anadromous Fish Restoration Program (USFWS, 1997). The U. S. Bureau of Reclamation (BOR) is the lead federal sponsor. Construction of the fish screen facility will be funded by private, state, and federal grants under several programs, including the Central Valley Project Improvement Act (CVPIA) Fund, Bay-Delta Accord Category III funds and CALFED program funds.

The BOR initiated formal Section 7 consultation in a letter dated November 1, 1999, to the National Marine Fisheries Service (NMFS) for the purpose of determining whether the project was likely to jeopardize the federally threatened Central Valley evolutionarily significant unit (ESU) of steelhead known to occur in the project area. NMFS began its Section 7 consultation at that time as the formal request was accompanied by a complete biological assessment.

This opinion is based on the written descriptions of the fish screen project (Montgomery Watson, 1996; BOR, 1999; Anonymous, 2000; BOR/BCID, 2000), discussions with NMFS hydraulic engineers, an on-site visit with staff from BCID and BOR, and a review of the best available ecological literature on steelhead.

The Administrative Record for this consultation is maintained at the NMFS Santa Rosa office, 777 Sonoma Ave., Room 325, Santa Rosa, California, 95404.

II. PROPOSED ACTION

Introduction

The federal action involves the BOR funding, through cost-sharing, the construction of a new positive-barrier fish screen for BCID's diversion canal that is currently unscreened. The BCID would use the funds to construct the fish screen facility in their diversion canal located on the San Joaquin River. The purpose of the fish screen facility is to improve passage past the diversion canal for sensitive life stages of steelhead that inhabitat the San Joaquin River and its tributaries. The San Joaquin River is part of the California Central Valley Evolutionarily Significant Unit (ESU) for the federally threatened steelhead (*Onchorynchus mykiss*) and was designated by NMFS as steelhead critical habitat on February 16, 2000.

Action Area

The Proposed Fish Screen and Fish Bypass System at BCID's canal is located in an unscreened, diversion canal on the San Joaquin River at River Mile 63.5 about 5 miles north of Vernalis, California and 8 miles east of Tracy, California. The San Joaquin River generally flows in a northward direction in the project area and the unscreened BCID diversion canal extends from the river to the southwest approximately 6,000 feet to the BCID Pumping Plant No. 1.

Proposed Action

The project action occurs both within and outside the BCID diversion canal. Within the canal, BCID proposes to construct and operate a fish-screen/bypass facility located within the defined levees of BCID's diversion canal near the river. The proposed structure will be located near the mouth of the BCID diversion canal and will consist of barrier wall, a vee-shaped fish screen, and a bypass system. The barrier wall will concentrate diversion flows to a 15-foot-wide opening in the wall that is fitted with a trash rack. Wing walls extending upstream from the trash rack to the canal banks will enhance hydraulics and is intended to eliminate predator fish holding zones.

The proposed screen consists of two rows of 11 screen panels in a vee orientation. Each screen panel is 6 feet high and 9.5 feet wide, supplying a total of 1,250 ft^2 of screen area. The distance between the two rows of screen panels is 15 feet at the upstream end and converges to 1.5 feet at the downstream end. Blank steel panels located above each screen panel will prevent water from passing over the screen panels into the BCID canal when river stages are high. The screen will be cleaned with an automatic brush system and silt accumulation will be reduced with water jets directing silt into the fish bypass. Adjustable flow control baffles will be added behind each screen panel to ensure water velocities through the screens are uniform over the entire screen area. NMFS hydraulic engineers are actively involved in project design to insure that hydraulic criteria established by NMFS is met.

The screen approach velocity is proposed to be approximately 40 percent less than the approach velocity that results in the impingement of juvenile steelhead. Because some fish may be entrapped by the water currents produced by pumps to withdraw water from the canal for irrigation purposes, a fish bypass will also be installed. The fish bypass will collect fish that are being guided along the fish screen face and return them to the river, downstream of the diversion canal. In addition, the bypass system will also carry away debris and other matter cleaned off the screens that has passed through the trash racks. Steelhead entrained in the diversion canal will be returned to the river via a bypass system. The bypass system will draw water and fish from the apex of the screen structure, through a helical-centrifugal pump, and pass them through a pipe.

The helical-centrifugal pump will be similar to those previously used successfully to move fish (e.g., Red Bluff Pumping Plant). The pipe will be 36 inches in diameter, approximately 1,000 feet long, and will be buried along the bank of the BCID canal. The approximate transport time will be 3 to 5 minutes at flow rates of approximately 6 feet per second (fps). The bypass outlet will be submerged in the river channel at a location downstream of the BCID canal entrance where river flows will disburse the rerouted fish.

Construction of the fish screen and bypass system is expected to take approximately 6 - 9 months to complete. The screen and bypass outlet sites will be dewatered to enable construction. The dewatering effort will be accomplished in several steps. Initially, sheet pile will be installed to form the coffer dam that will later serve as the barrier wall. Additional sheet pile will isolate a section of the barrier wall to install temporary culverts through which BCID will be able to divert river water for normal irrigation operations during the period of construction. Once the temporary diversion culverts are operable, the rest of the construction area will be sealed off with additional sheet pile, and the in-canal work area will be dewatered. The site of the bypass outlet structure will also require dewatering for construction. A small area at the diversion canal entrance will be dewatered for construction activities by enclosing the area with a sheet pile coffer dam.

Several prevention measures and monitoring efforts are also proposed for this project. To minimize construction effects, the sponsor proposes to implement measures to control soil erosion and runoff of polluted stormwater from the project site. These include: avoiding work or equipment operation in flowing water during in-channel activities by constructing cofferdams and diverting all flows around construction sites, minimizing the potential for sediment input to aquatic system; constructing sediment catch basins across the river channel immediately below the project area (and periodically removing sediments from the catch basin) when performing in-channel construction to prevent silt- and sediment-laden water from entering the main flow; limiting in-channel construction (to the extent feasible) to the summer low-precipitation period (July 1-October 15); participation by construction personnel in an environmental awareness program; implementing a toxic materials control and spill response plan; and submitting this plan to the Regional Water Quality Control Board and California Department of Fish and Game with its applications for Section 401 water quality certification and the streambed alteration agreement, respectively, before construction begins.

BCID proposes to evaluate the biological effects of the fish facility, including a one-time evaluation of the bypass facility and a fish-screen hydraulic performance evaluation program in the first year following construction.

III. STATUS OF LISTED SPECIES AND CRITICAL HABITAT

This Opinion analyzes the effects of BCID's Fish Screen/Bypass Facility Project on the Federally threatened Central Valley steelhead (*Oncorhynchus mykiss*) and its designated critical habitat within the action area.

Central Valley Steelhead - Threatened: Population Trends, Life History, and Biological Requirements

Effective March 19, 1998, NMFS listed Central Valley steelhead as threatened under the Endangered Species Act (63 FR 13347). Central Valley steelhead once ranged throughout most of the tributaries and headwaters of the Sacramento and San Joaquin basins prior to dam construction, water development, and watershed perturbations of the 19th and 20th centuries (McEwan and Jackson, 1996). Historical documentation exists that show steelhead were once widespread throughout the San Joaquin River system (Yoshiyama et al., 1996). In the early 1960s, the California Fish and Wildlife Plan estimated a total run size of about 40,000 adults for the entire Central Valley including San Francisco Bay (CDFG, 1965). The annual run size for this ESU in 1991-92 was probably less than 10,000 fish based on dam counts, hatchery returns and past spawning surveys (McEwan and Jackson, 1996).

Within the Central Valley, viable populations of naturally produced steelhead are found only in the Sacramento River and its tributaries (USFWS, 1998). At present, wild steelhead stocks appear to be mostly confined to upper Sacramento River tributaries such as Antelope, Deer, and Mill creeks and the Yuba River (McEwan and Jackson, 1996). No significant steelhead populations remain in the San Joaquin River system (USFWS, 1998). However, the presence of naturally spawning populations appears to correlate well with the presence of fisheries monitoring programs, and recent implementation of new monitoring efforts has found steelhead in streams previously thought not to contain a population, such as Auburn Ravine, Dry Creek, and the Stanislaus River which feeds the San Joaquin River. It is possible that other naturally spawning populations exist in Central Valley streams, but are undetected due to lack of monitoring or research programs (IEP Steelhead Project Work Team ,1999).

All Central Valley steelhead are currently considered winter-run steelhead (McEwan and Jackson, 1996). There are indications that summer steelhead were present in the Sacramento River system prior to the commencement of large-scale dam construction in the 1940's (IEP Steelhead Project Work Team, 1999). River entry ranges from July through May, with peaks in September and February (McEwan and Jackson, 1996). The timing of upstream migration is generally correlated with higher flow events, such as freshets or sand bar breaches, and associated lower water temperatures. The preferred temperatures for upstream migration are between 46° F and 52° F (Reiser and Bjornn, 1979). Unusual stream temperatures during upstream migration periods can alter or delay migration timing, accelerate or retard mutations, and increase fish susceptibility to diseases. The minimum water depth necessary for successful upstream passage is 18 cm (Thompson, 1972). Reiser and Bjornn (1979) indicated that steelhead preferred a depth of 24 cm or more. Velocities of 3-4 meters per second approach the upper swimming ability of steelhead and may retard upstream migration (Reiser and Bjornn, 1979).

Spawning may begin as early as late December and can extend into April with peaks from

January through March (Hallock et al., 1961). Unlike chinook salmon, not all steelhead die after spawning. Some may return to the ocean and repeat the spawning cycle for two or three years; however, the percentage of repeat spawners is generally low (Busby et al. 1996). Steelhead spawn in cool, clear streams featuring suitable gravel size, depth, and current velocity. Intermittent streams may be used for spawning (Barnhart 1986; Everest 1973).

After hatching, pre-emergent fry remain in the gravel living on yolk-sac reserves for another four to six weeks, but factors such as redd depth, gravel size, siltation, and temperature can speed or retard this time (Shapovalov and Taft, 1954). Fry typically emerge from the gravel two to three weeks after hatching (Barnhart, 1986). Upon emergence, steelhead fry typically inhabit shallow water along perennial stream banks. Older fry establish territories which they defend. Streamside vegetation is essential for foraging, cover, and general habitat diversity. Steelhead juveniles are usually associated with the bottom of the stream.

The majority of steelhead in their first year of life occupy riffles, although some larger fish inhabit pools or deeper runs. Juvenile steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Water temperatures influence the growth rate, population density, swimming ability, ability to capture and metabolize food, and ability to withstand disease of these rearing juveniles. Rearing steelhead juveniles prefer water temperatures of 45°F to 60°F (Reiser and Bjornn, 1979; Bell, 1991). During rearing, suspended and deposited fine sediments can directly affect salmonids by abrading and clogging gills, and indirectly cause reduced feeding, avoidance reactions, destruction of food supplies, reduced egg and larval survival, and changed rearing habitat (Reiser and Bjornn, 1979).

After spending one to three years in freshwater, juvenile steelhead migrate downstream to the ocean. Juvenile steelhead live in freshwater between one and four years (usually one to two years in the Pacific Southwest) and then become smolts and migrate to the sea from November through May with peaks in March, April, and May. For the San Joaquin River, emigration normally occurs from November through mid April (CACSST, 1988). Fish size appears to be positively correlated with water velocity and depth (Chapman and Bjornn, 1969, Everest and Chapman, 1972). Most Central Valley steelhead migrate to the ocean after spending two years in freshwater (Hallock et al., 1961). In preparation for their entry into a saline environment, juvenile steelhead undergo physiological transformations known as smoltification that adapt them for their transition to salt water. Barnhart (1986) reported that steelhead smolts in California range in size from 14 to 21 cm (fork length). Hallock et al. (1961) found that juvenile steelhead in the Sacramento Basin migrated downstream during most months of the year, but the peak period of emigration occurred in the spring, with a much smaller peak in the fall.

Steelhead spend between one and four years in the ocean (usually one to two years in the Central Valley) before returning to their natal streams to spawn (Barnhart, 1986; Busby et al., 1996).

Further information is available in the NMFS Status Review of west coast steelhead from Washington, Idaho Oregon, and California (Busby et al., 1996), the NMFS Status Review for Klamath Mountains Province Steelhead (Busby et al., 1994), the NMFS final rule listing the

Southern California Coast steelhead ESU, South Central California Coast steelhead ESU, and the Central California Coast steelhead ESU (NMFS,1997) and the NMFS final rule listing the Northern California steelhead ESU (NMFS, 2000).

Central Valley Steelhead Critical Habitat

The final rule designating steelhead critical habitat was issued on February 16, 2000 (65 FR 7764). Critical habitat consists of the water, substrate, and adjacent riparian zone of accessible estuarine and riverine reaches. Accessible reaches are those within the historical range of the ESU that can still be occupied by any life stage of steelhead. Inaccessible reaches are those above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years) and specific dams within the historical range of each ESU.

Critical habitat for Central Valley steelhead is designated to include all river reaches accessible to listed steelhead in the Sacramento and San Joaquin Rivers and their tributaries in California. Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta, all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait, all waters of San Pablo Bay westward of the Carquinez Bridge, and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas of the San Joaquin River upstream of the Merced River confluence and areas above specific dams (e.g., Crocker Diversion Dam, La Grange Dam, Goodwin Dam) or above longstanding naturally impassable barriers.

The diversion canal is directly connected to the San Joaquin River and is therefore subject to full fluctuation in river water levels. Because critical habitat for Central Valley steelhead is designated to include all river reaches accessible to listed steelhead in the Sacramento and San Joaquin Rivers, the canal itself is considered critical habitat. However, the construction and operation of the fish screen will limit the length of the boundless canal to a closed-end one, terminating 400 feet from the San Joaquin River and the mouth of the intake channel. The proposed project is beneficial because it limits this portion of critical habitat to safer areas for steelhead and does not adversely affect the functioning of the habitat. Therefore, critical habitat is not considered further in this opinion.

ENVIRONMENTAL BASELINE

The San Joaquin River Basin covers over 15,500 square miles and is bounded by the Sacramento-San Joaquin Delta on the north, the Tehachipi Mountains on the south, the Coast Range on the west, and the Sierra Nevada Range on the east. The San Joaquin River Basin has greater amounts of land suitable for irrigated agriculture than does the Sacramento Valley but receives less that one-third as much moisture (BOR, 1986). The result of these conditions is that the proportion of water diverted from the San Joaquin River system for irrigation purposes is much greater than that diverted from the Sacramento River system (BOR, 1986).

Status of the Listed Central Valley Steelhead in the Action Area

Populations of native steelhead have declined dramatically since Euro-American settlement began in the Central Valley in the mid-1800s (USFWS, 1998). Although the San Joaquin River once supported steelhead runs, these runs have been reduced to remnant levels by water development facilities and operations, and other forms of habitat loss and degradation (USFWS, 1995; NMFS, 1996). Specifically, these declines are due to dam construction, aggregate mining, water diversions, clearing and filling for agriculture, fishing and other human activities (Kondolf et al., 1996). While rainbow trout/steelhead are known to occur in the Stanislaus, Tuolumne and Merced Rivers, there are no reliable estimates of run sizes and their use of these three tributaries to the San Joaquin River is considered to be sporadic (USFWS, 1998). Adults migrate through the Vernalis corridor of the San Joaquin River from November through May. Rearing takes place over a period of one year, with fry rearing occurring from April to August. Juvenile rearing occurs throughout the remainder of the year, with the smaller juveniles present from April through September. The emigration of juveniles begins in November and continues through May with the peak in February and March (USFWS, 1995). Since the majority of Central Valley steelhead historical spawning and rearing habitat in the Sacramento and San Joaquin River basins is no longer accessible due to impassable dams, the accessible areas of the Feather River, Clear Creek, upper Sacramento River, American River and the Stanislaus River represent an essential portion of the critical habitat for this steelhead ESU.

Central Valley steelhead populations within the action area generally show a continuing population decline and an overall low population abundance. (S. Baumgautner, CDFG. pers. comm, 5/12/2000). Historical abundance estimates are available within the action area but no overall reliable estimates are available (S. Baumgautner, CDFG. pers. comm, 5/12/2000).

All emigrating juvenile Central Valley steelhead smolts use the lower reaches of the Sacramento and San Joaquin rivers and the Delta for rearing and as migration corridor to the ocean. Near the project area, smolts range in size from 6.3 - 8.3 inches (160 - 210 mm) (S. Baumgautner, CDFG. pers. comm, 5/12/2000). Some juveniles may utilize tidal and non-tidal freshwater marshes and other shallow water areas in the Delta as rearing areas for short periods prior to the final portion of their emigration to the sea. All adult steelhead use the Delta and lower reaches of the Sacramento and San Joaquin rivers as an upstream migration corridor to return to their natal streams for spawning.

The lower San Joaquin River sustains a diverse assemblage of native and exotic fish species. Predatory fish species known to occur in the project area include bass species (*Micropterus spp.*), sunfish (*Lepomis* spp.) and striped bass (*Morone saxatilis*) (BOR, 2000).

Estimates of steelhead historical habitat can be based on estimates of salmon historical habitat. The extent of habitat loss for steelhead is probably greater than losses for salmon, because steelhead go higher into the drainages than do chinook salmon (Yoshiyama et al., 1996). Clark (1929) estimated that originally there were 6,000 miles of salmon habitat in the Central Valley system and that 80% of this habitat had been lost by 1928. Yoshiyama et al. (1996) calculated that roughly 2,000 miles of salmon habitat were actually available before dam construction and mining, and concluded that 82% of what was present is not accessible today. Clark (1929) did not give details about his calculation. Whether Clark’s or Yoshiyama=s calculation is used, only remnants of the former steelhead range remain accessible today in the Central Valley.

Impassable dams block access to most of the historical headwater spawning and rearing habitat of Central Valley steelhead. In addition, much of the remaining, accessible spawning and rearing habitat is severely degraded by elevated water temperatures, agricultural and municipal water diversions, unscreened and poorly screen water intakes, restricted and regulated streamflows, levee and bank stabilization, and poor quality and quantity of riparian and shaded riverine aquatic (SRA) habitat cover.

Factors Affecting Species Environment Within the Action Area

The project area is located in the farming community area on the floor of the San Joaquin Valley. Flows in the San Joaquin River at the diversion site are regulated by several reservoirs operating in the upper watershed. Daily flow records from the Vernalis gaging station evaluated for the 1930-1995 period indicate a maximum daily flow of 79,000 cfs and a minimum flow of 19 cfs (BOR, 1999). Diversions from the San Joaquin River into the unscreened BCID diversion canal typically begin in March and end in November with average monthly diversion rates ranging from 150 to 215 cfs from May through August. With the exception of the1971-1976 timeframe when the California Department of Fish and Game constructed and operated a screening facility in the BCID canal, the diversion canal has not operated with fish screens. To illustrate its potential impact on fishery resources, one study reported about 20,000 juvenile chinook salmon were lost during a 2-month period before the diversion was screened (Hallock and Van Woert, 1959).

IV. EFFECTS OF THE PROJECT ACTION

Effects of the proposed project on steelhead are those associated with site preparation, operation of the water diversion canal and operation of the bypass system. Effects may include steelhead smolts inadvertently utilizing the inlet canal for rearing purposes during their outmigration to sea and exposure to fish predation upon discharge from the fish screen-bypass system. Take is possible in the form of capture, trap, harm, harassment, injury, and mortality of juvenile steelhead during and as a result of short-term construction activities as well as long-term fish screen and fish bypass operations.

The following is a discussion of specific effects of the proposed project on steelhead. These effects are categorized into three categories: interruption of downstream migration, fish bypass predation and potential impacts to rearing steelhead during construction.

Interruption of Downstream Migration

The new vertical, vee-shaped fish screen structure and bypass system will be located within the defined levees of BCID’s 200 - 400 ft. diversion canal (depending on river water levels) connected to the San Joaquin River. At full diversion flows, water velocities will range between 2.8 fps at low river water and 0.8 fps at high water. Diversion from BCID’s canal will typically begin in March and end in November with average monthly diversion rates ranging from 150 to 215 cfs from May through August. Because naturally spawning populations of steelhead are known to occur in the Stanislaus River, upstream of the project area, the steelhead occurring in the vicinity of the intake canal during the March - May period are expected to be smolts in the 16 to 21 cm long size range. The emigration of steelhead smolts begins in November and continues through May, with the peak in February and March (USFWS, 1995). This suggests that downstream emigrants may interact with BCID's diversion canal operations in the March through May timeframe with greatest interactions potentially occurring in March. Steelhead at 15 cm long prefer water velocities at 24 cm/sec (0.8 fps) (Bjornn and Reiser, 1991) which suggests that the lower flow regimes in the intake canal, relative to San Joaquin River water levels and flow rates, may be periodically preferred by steelhead smolts thereby attracting them towards the convergence at the downstream end of the diversion canal. The possibility also exists for some steelhead smolts to enter the diversion canal and become disoriented (e.g., conditions of high turbidity, evening hours) and similarly become entrapped in the diversion system and subsequently diverted through the bypass.

While information on steelhead survival through bypass pumps was not available, information on tests performed on juvenile chinook salmon passing through a helical-centrifugal pump bypass indicate low mortality rates of approximately 3 percent (McNabb et al., 1998). An additional 0.6 percent and 1.2 percent of the juvenile chinook entrained exhibit external injuries (McNabb et al., 1998). In addition, these fish may likely undergo stress responses as measured by a rapid rise in blood plasma cortisol concentrations, a more general stress-response measure (Anonymous, 2000). If appreciably stressed by pump passage and returned to the river, the fish may undergo indirect mortality (e.g., predation) (Anonymous, 2000). In consideration of the existing conditions where no screening protection is currently provided and fish are entrained and die at the diversion intake, the degree of these expected impacts may be considered minimal. However, some degree of impact to listed steelhead smolts may be expected that will include capture, injury, harassment and mortality of juveniles at the screen facility and within the bypass. These impacts could be higher and could include injuries if the fish-screen/bypass facility is not correctly designed to minimize undue turbulence or abrasion to steelhead during their conveyance through the system.

Fish Predation

The use of bypass systems to route fish around water-intake operations is common in both freshwater and marine systems. While usually successful in returning fish to their natural environment, the condition of these returned fish is often questionable. Not only can fish experience physical damage (e.g., abrasions, loss of scales) as they pass through the bypass pipe, but they can also be functionally disoriented as they are ejected out of the bypass pipe. In experiments designed to record behavioral stress-responses of juvenile chinook salmon through pumping plants, fish were shown to not resume normal swimming and schooling activity for 10-40 minutes after cessation of the experiment (Anonymous, 2000). Similar behavior may be expected for the proposed fish bypass system as steelhead smolts will experience a 3-5 minute transport time in the darkened pipeline. Assuming that rheotaxis behavior (i.e., orientation to water currents) will cease during transport through the bypass, it can be surmised that fish released at the terminus of the bypass may experience some form of disorientation as has been observed in marine bypass systems (M. Helvey, pers. obs.). The ejection of stressed or disoriented fish at the bypass raises their susceptibility to ambush by predatory fishes (e.g., largemouth bass or striped bass) should these predatory fishes frequent the vicinity of the bypass outlet.

Regardless of the severity or duration of stress conditions for steelhead ejected from the bypass, the potential for predatory fish to develop learned behaviors at the terminus of the bypass is high if habitat conditions are conducive for allowing predators to remain in these areas. Similarly, predators could find suitable habitat conditions (e.g., cover) in the intake canal and ambush smolts entering the intake canal. Consequently, NMFS believes that the potential for take exists in the form of increased predation on steelhead diverted to the intake canal and/or discharged through the bypass system than otherwise would occur if they were not subjected to the fish screen/bypass facility.

Potential Impacts to Rearing Steelhead During Construction

Preparation of the site for project construction including the installation of sheet piling and dewatering of the workspace could harm individual steelhead by concentrating or stranding them in residual wetted areas (Cushman, 1985) or by causing them to migrate to adjacent habitats (Clothier, 1953; Clothier, 1954; Kraft;1972, Campbell and Scott, 1984). Dewatering the workspace may cause harm, injury, or death to steelhead by confining them to areas that are predisposed to dewatering, increased water temperature, decreased dissolved oxygen concentration, and predation (Cushman, 1985).

The BCID will require, to the extent feasible, the contractor to limit in-channel construction to the summer low-precipitation period (July 1- October 15). Juvenile steelhead may be present in the project area during construction of the fish screen and bypass system could become stranded behind the cofferdam. However, because fish can freely avoid the construction area and swim to undisturbed areas as construction activities are initiated (e.g., initial placement of sheet piling), it is very unlikely that they will be adversely affected.

V. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Future agricultural-related activities and urban development in the area considered in this opinion are likely to continue to degrade the habitat of the steelhead. These activities will adversely affect water quality, riparian function and stream productivity.

VI. INTEGRATION AND SYNTHESIS OF EFFECTS

Based on the effects analysis, the most serious impact to steelhead smolts in the project area of the San Joaquin River appears to be the potential interruption of downstream migration once the facility is operational. This interruption can result in harm or mortality to steelhead smolts. While the interruption of migratory behavior may occur regularly, it does not impose an adverse threat to the survival of steelhead in the San Joaquin River system for four reasons. First, the project improves fish passage past the diversion canal as the diversion canal is currently operated without the benefit of screens. The installation and operation of fish screens and the bypass system should substantially reduce the entrainment and subsequent mortality of outmigrating steelhead smolts and as a result is expected to benefit the steelhead population in the San Joaquin River Basin. Second, the design criterion for the fish screen approach velocities of the proposed project would be approximately 40 percent less than the approach velocity that results in the impingement of juvenile steelhead. Due to the large, 6 - 8 inch size of steelhead smolts that would be encountering the fish screens, it is likely that steelhead smolts could avoid the bypass altogether by swimming away from the screens and back into the San Joaquin River. NMFS was an active participant with other state and federal agencies in the technical review of the fish-screen/bypass system. Third, for steelhead smolts that do enter the bypass, the chances for survival are still considerably higher than the current condition of an unscreened, unprotected diversion of San Joaquin River water into BCID's canal. Fourth, while increased predation by warm water species on disoriented steelhead smolts may occur at the terminus of the bypass, the level of predation may not significantly differ from normal predation rates occurring within the San Joaquin River ecosystem assuming that the diversion canal and bypass outlet do not offer suitable habitat to warm-water predators. Overall, the net benefits in reducing the entrainment of steelhead smolts should assist in the recovery of the population and improve the viability of steelhead in this particular riverine system. The short term construction impacts of the project and cumulative effects are fairly minor in nature and do not impose serious threats to this steelhead population or to the larger ESU.

VII. CONCLUSION

After reviewing the best available scientific and commercial data, the current status of steelhead, the environmental baseline for the action area, the effects of the proposed BCID's Fish-Screen Bypass Project, and the cumulative effects, it is NMFS' biological opinion that the project action, as proposed, is not likely to jeopardize the continued existence of the federally threatened Central Valley ESU of steelhead.

VIII. INCIDENTAL TAKE STATEMENT

Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7 (b) (4) and 7 (o)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with this Incidental Take Statement.

Section 7 (b)(4) of the ESA provides for the issuance of an incidental take statement for the agency action if the biological opinion concludes that the proposed action is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. In such a situation, NMFS will issue an incidental take statement specifying the impact of any incidental taking of endangered or threatened species, providing Reasonable and Prudent Measures that are necessary to minimize impacts, and setting forth the Terms and Conditions with which the action agency must comply in order to implement the Reasonable and Prudent Measures. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity.

The measures described below are non-discretionary and must be undertaken by BOR so that they become binding conditions of any grant or permit issued to BCID, as appropriate, for the exemption in section 7(o)(2) to apply. The BOR has a continuing duty to regulate the activity covered by this Incidental Take Statement. If BOR (1) fails to assume and implement the Terms and Conditions or (2) fails to require BCID to adhere to the Terms and Conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, BOR must report the progress of the action and its impact on the species to NMFS as specified in the Incidental Take Statement (50 CFR §402.14(I)(3)).

Amount or extent of take anticipated

NMFS anticipates incidental take of Central Valley steelhead smolts caused by capture and conveyance in the proposed BCID fish-screen/bypass facility. Numbers of individuals bypassed will be difficult to detect because of the variability and uncertainty in predicting juvenile production upstream of the action area and the lack of information indicating entrainment risk at the BCID canal. Incidental take in the form of capture and harassment would occur during fish bypass operations as rerouted steelhead are returned to the San Joaquin River.

Determining the precise number of individuals bypassed is not feasible. However, the extent of take can be estimated by the percentage of river flow diverted (assuming individuals are equally spaced throughout the river body). Based on a November through mid-April emigration pattern for steelhead smolts coinciding with monthly peak design flows of 250 cfs from BCID's canal beginning in March and ending in November, and that mean monthly flows for the San Joaquin River during 1975-1993 for November, March and April averaged 6167 cfs (Montgomery Watson, 1996), an estimated 4 percent of river flow will be diverted into BCID's canal. Therefore, NMFS authorizes the incidental take of Central Valley steelhead in the form of all juvenile steelhead present within 4 percent of the flow of the San Joaquin River being diverted into the BCID diversion canal at any given time. Three percent of these steelhead may be killed and another one percent may be injured.

NMFS also anticipates incidental take of Central Valley steelhead smolts caused by increased predation inside in the diversion canal and at the terminus of the bypass. Numbers of individuals preyed upon will be difficult to determine because of the complexity in quantifying feeding behavior and feeding rates of predators and the efficiency of smolts escaping predatory attacks. Further, attempts to count predators at these two sites may be difficult due to the prevailing poor water visibility conditions. However, the extent of take can be estimated by the condition of the habitat for sheltering predators (e.g., largemouth bass and striped bass) in the immediate vicinity of the intake canal and the bypass outfall. NMFS authorizes the incidental take of Central Valley steelhead in the form of no additional shelter or quiet areas (e.g., accumulation of woody debris, scour depressions in the river bottom) created at the intake canal and the area of the bypass outlet.

Effect of the take

In the accompanying biological opinion/conference opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the Central Valley Steelhead ESU when the following reasonable and prudent alternatives are implemented.

Reasonable and Prudent Measures

The NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of threatened Central Valley Steelhead caused by activities related to the Banta-Carbona Irrigation District Fish Screen Project:

1. BOR and BCID shall ensure that the fish-screen/bypass system is operated and maintained in a manner consistent with NMFS-approved fish screening criteria for anadromous salmonids (see Attachment 1).

2. BOR and BCID shall ensure that the fish-screen/bypass system is adequately evaluated to ensure optimum biological performance for fish passage and their safe return to the San Joaquin River.

3. BOR and BCID shall monitor the construction area and implement adequate control measures to avoid or minimize stranding and mortality of steelhead as well as sediment, turbidity and pollutant inputs to the San Joaquin River during construction and intake canal maintenance operations.

4. BOR and BCID shall prepare and submit monitoring reports prepared to document efficiency of fish-screen/bypass system operations.

5. BOR and BCID shall insure that no additional shelter or quiet areas (e.g., accumulation of woody debris, scour depressions in the river bottom etc.) used by predatory fishes will be created at the intake canal and the area of the bypass outlet.

Terms and Conditions

BOR and BCID are responsible for the following Terms and Conditions that implement the reasonable and prudent measures described above. These Terms and Conditions are intended to minimize incidental take of steelhead associated with the Banta-Carbona Irrigation District's Fish-Screen/Bypass Project and are non-discretionary.

1. BOR and BCID shall ensure that the fish-screen/bypass system is operated and maintained in a manner consistent with NMFS-approved fish screening criteria for anadromous salmonids (see Attachment A).

A. BOR and BCID shall incorporate design criteria consistent with the fish screening guidelines and criteria guidelines promulgated by NMFS, Southwest Region to avoid and minimize direct mortality resulting from entrainment and predation during BCID diversions.

B. BOR and BCID shall develop a proposed operations and maintenance plan for the fish-screen/bypass facility. The plan shall address periodic underwater inspections, periodic assessment of screen physical performance, and shall detail routine and emergency operations and maintenance including the replacement and repair of screens and other components of the facility. This plan shall be submitted to NMFS for review and approval before diversion operations begin. NMFS shall provide in writing either concurrence with the plan or notification to BOR and BCID that plan modifications are necessary for acceptance.

C. BCID shall curtail all diversion from the San Joaquin River when any portion of the fish screen structure is damaged or removed for maintenance or repair which allows unscreened water to pass. BCID operations may resume when the fish screen structure becomes fully operational.

D. An operations and maintenance log book shall be maintained on a daily basis. The log book shall be made available for inspection to NMFS personnel with 24 hours notice.

E. NMFS staff, including diving personnel, shall be granted access to the site for inspection and measurement of fish screen performance and bypass outfall conditions. NMFS will provide a minimum of 48 hours advance notice to BOR and BCID for requesting access.

2. BOR and BCID shall ensure that the fish-screen/bypass system is adequately evaluated to ensure optimum biological performance for fish passage and their safe return to the San Joaquin River.

A. BOR and BCID shall develop a Fish Protection and Evaluation/Monitoring Plan designed to evaluate and monitor the biological efficacy of the fish-screen/bypass system. The Plan shall describe studies used to evaluate fish-screen/bypass performance including: mechanical systems, fish entrainment, juvenile fish bypass, fish screen hydraulics and predation. The Plan shall provide measurable objectives, indicators of performance in meeting these objectives, and suggested measures for improving the biological efficacy of the fish-screen/bypass system if objectives are not met. This Plan shall be submitted to NMFS for review and approval before construction can begin. NMFS shall provide in writing either concurrence with the plan or notification to BOR and BCID that plan modifications are necessary for acceptance.

B. BOR and BCID shall immediately evaluate the biological efficacy of the fish-screen/bypass system once operations begin as outlined in the evaluation plan using test fish to determine if measurable objectives set to evaluate the performance of the screens, fish pumps and bypass system have been met.

3. BOR and BCID shall monitor the construction area and implement adequate control measures to avoid or minimize stranding and mortality of steelhead as well as sediment, turbidity and pollutant inputs to the San Joaquin River during construction and intake canal maintenance operations.

A. At the time of the project action, BOR and BCID shall prepare and implement a Water Pollution Plan to avoid or minimize increased sediment and turbidity impacts. This plan shall include designating an erosion control specialist. The specialist shall demonstrate adequate experience in the field of erosion and sedimentation control and shall have authority to oversee and direct the implementation of this plan and placement and application of erosion control and sediment detention devices during the project action and afterwards if necessary.

B. Erosion control and sediment detention devices shall be incorporated into the project and implemented at the time of the project action. These devices shall be in place during the project action, and after if necessary, for the purpose of minimizing fine sediment and sediment/water slurry input to flowing water. The devices shall be placed at all locations where the likelihood of sediment input exists.

C. At the time of the project action, BOR and BCID shall prepare and implement a Storm Water Pollution Prevention Plan as part of the National Pollutant Discharge Elimination System (NPDES) General Construction Activity Storm Water Permit to avoid or minimize increased sediment and turbidity impacts. These plans will be reviewed and approved by NMFS.

D. At the time of the project action, BOR and BCID shall prepare and implement a Toxic Material Control and Spill Response Plan to avoid or minimize increased pollutant inputs. These plans will be reviewed and approved by NMFS.

E. BOR and BCID shall retain a fisheries biologist with expertise in the areas of resident or anadromous salmonid biology and ecology, fish/habitat relationships, biological monitoring, handling, collecting, and relocating salmonid species. The biologist will monitor activities prior to and during in-channel activities. The biologist shall monitor placement and removal of the channel diversions for the purpose of removing any steelhead that would be adversely affected. The biologist shall capture such steelhead individuals stranded in residual wetted areas as a result of streamflow diversion and workspace dewatering, and relocate the individuals to a suitable locations downstream of the particular project area. One or more of the following NMFS approved methods shall be used to capture steelhead: dip net, seine, throw net, minnow trap, and hand. Electrofishing may only be used if NMFS reviews the biologist's qualifications and gives approval. The biologist shall contact NMFS (Mike Aceituno at 916-498-6498) immediately if one or more steelhead are found dead or injured as a result of project activities. The purpose of the contact shall be to review the activities resulting in take and to determine if additional protective measures are required.

F. BOR and BCID shall isolate each workspace for the purpose of avoiding sedimentation, turbidity, and direct effects to steelhead. Prior to construction activities, diversion materials shall be installed (e.g., sandbag cofferdams, straw bales) to divert streamflow away or around each workspace. The diversion shall remain in place during the project, then removed immediately after work is completed.

4. BOR and BCID shall prepare and submit reports that document construction results and assess the efficiency of fish-screen/bypass system operations.

A. BOR and BCID shall provide a written report to NMFS within 30 working days following completion of construction. The report shall include a review of the construction process, identification of unforeseen events or problems, and a description of any effect of the project action on steelhead that was not previously considered (reinitiation of consultation would be required, see section IX, item 2 of the Biological Opinion).

B. BOR and BCID shall prepare a written report describing results of their Evaluation/Monitoring Plan to NMFS on a schedule that is developed in the Evaluation/Monitoring Plan.

C. All reports, proposed plans, and annual updates shall be submitted to: Mr. Michael Aceituno, Protected Resources Division, NMFS, 650 Capitol Mall, Suite 6070, Sacramento, California 95814, (916) 498-6498, Fax (916) 498-6697.

5. BOR and BCID shall insure that no additional shelter or quiet areas (e.g., accumulation of woody debris, scour depressions in the river bottom etc.) used by predatory fishes will be created at the intake canal and the area of the bypass outlet than would occur naturally.

A. BOR and BCID shall periodically inspect the diversion canal and the bypass terminus to insure that favorable habitat conditions (e.g., scour areas, debris accumulations etc.) that allow for predatory fishes to assemble have not been created.

B. BOR and BCID shall take measures to remove favorable habitat conditions for predatory fishes at the diversion canal or bypass terminus identified during inspections.

IX. REINITIATION OF CONSULTATION

Reinitiation of formal consultation is required if there is discretionary Federal involvement or control over the action and if (1) the amount or extent of taking specified in any incidental take statement is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the action is subsequently modified in a manner that causes an effect to the listed species that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. If the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately.

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ATTACHMENT A

National Marine Fisheries Service
Southwest Region

Fish Screening Criteria for Anadromous Salmonids (1)

January 1997

Table of Contents

I. General Considerations

This document provides guidelines and criteria for functional designs of downstream migrant fish passage facilities at hydroelectric, irrigation, and other water withdrawal projects. It is promulgated by the National Marine Fisheries Service (NMFS), Southwest Region as a result of its authority and responsibility for prescribing fishways under the Endangered Species Act (ESA), the Federal Power Act, administered by the Federal Energy Regulatory Commission (FERC), and the Fish and Wildlife Coordination Act (FWCA), administered by the U.S. Fish & Wildlife Service.

The guidelines and criteria are general in nature. There may be cases where site constraints or extenuating circumstances dictate a waiver or modification of one or more of these criteria. Conversely, where there is an opportunity to protect fish, site-specific criteria may be added. Variances from established criteria will be considered on a project-by-project basis.

The swimming ability of fish is a primary consideration in designing a fish screen facility. Research shows that swimming ability varies depending on multiple factors relating to fish physiology, biology, and the aquatic environment. These factors include: species, physiological development, duration of swimming time required, behavioral aspects, physical condition, water quality, temperature, lighting conditions, and many others. Since conditions affecting swimming ability are variable and complex, screen criteria must be expressed in general terms and the specifics of any screen design must address on-site conditions.

NMFS may require project sponsors to investigate site-specific variables critical to the fish screen system design. This investigation may include fish behavioral response to hydraulic conditions, weather conditions (ice, wind, flooding, etc.), river stage-discharge relationships, seasonal operations, sediment and debris problems, resident fish populations, potential for creating predation opportunity, and other pertinent information. The size of salmonids present at a potential screen site usually is not known, and can change from year-to-year based on flow and temperature conditions. Thus, adequate data to describe the size-time relationship requires substantial sampling over a number of years. NMFS will normally assume that fry-sized salmonids are present at all sites unless adequate biological investigation proves otherwise. The burden of proof is the responsibility of the owner of the screen facility.

New facilities which propose to utilize unproven fish protection technology frequently require:

1) development of a biological basis for the concept;

2) demonstration of favorable behavioral responses in a laboratory setting;

3) an acceptable plan for evaluating the prototype installation;

4) an acceptable alternate plan should the prototype not adequately protect fish. Additional information can be found in *Experimental Fish Guidance Devices*, position statement of the National Marine Fisheries Service, Southwest Region, January 1994.

Striped Bass, Herring, Shad, Cyprinids, and other anadromous fish species may have eggs and/or very small fry which are moved with any water current (tides, streamflows, etc.). Installations where these species are present may require individual evaluation of the proposed project using more conservative screening requirements. In instances where state or local regulatory agencies require more stringent screen criteria to protect species other than salmonids, NMFS will generally defer to the more conservative criteria.

General screen criteria and procedural guidelines are provided below. Specific exceptions to these criteria occur in the design of small screen systems (less than 40 cubic feet per second) and certain small pump intakes. These exceptions are listed in Section K, Modified Criteria for Small Screens, and in the separate addendum entitled: Juvenile Fish Screen Criteria For Pump Intakes, National Marine Fisheries Service, Portland, Oregon, May 9, 1996.

II. General Procedural Guidelines

For projects where NMFS has jurisdiction, such as FERC license applications and ESA consultations, a functional design must be developed as part of the application or consultation. These designs must reflect NMFS design criteria and be acceptable to NMFS. Acceptable designs typically define type, location, method of operation, and other important characteristics of the fish screen facility. Design drawings should show structural dimensions in plan, elevation, and cross-sectional views, along with important component details. Hydraulic information should include: hydraulic capacity, expected water surface elevations, and flows through various areas of the structures. Documentation of relevant hydrologic information is required. Types of materialsmust be identified where they will directly affect fish. A plan for operations and maintenance procedures should be included-i.e., preventive and corrective maintenance procedures, inspections and reporting requirements, maintenance logs, etc.- particularly with respect to debris, screen cleaning, and sedimentation issues. The final detailed design shall be based on thefunctional design, unless changes are agreed to by NMFS.

All juvenile passage facilities shall be designed to function properly through the full range of hydraulic conditions expected at a particular project site during fish migration periods, and shall account for debris and sedimentation conditions which may occur.

III. Screen Criteria for Juvenile Salmonids

A. Structure Placement

1. General:

The screened intake shall be designed to withdraw water from the most appropriate elevation, considering juvenile fish attraction, appropriate water temperature control downstream or a combination thereof. The design must accommodate the expected range of water surface elevations.

For on-river screens, it is preferable to keep the fish in the main channel rather than put them through intermediate screen bypasses. NMFS decides whether to require intermediate bypasses for on-river, straight profile screens by considering the biological and hydraulic conditions existing at each individual project site.

2. Streams and Rivers:

Where physically practical, the screen shall be constructed at the diversion entrance. The screen face should be generally parallel to river flow and aligned with the adjacent bankline. A smooth transition between the bankline and the screen structure is important to minimize eddies and undesirable flow patterns in the vicinity of the screen. If trash racks are used, sufficient hydraulic gradient is required to route juvenile fish from between the trashrack and screens to safety.

Physical factors that may preclude screen construction at the diversion entrance include excess river gradient, potential for damage by large debris, and potential for heavy sedimentation. Large stream-side installations may require intermediate bypasses along the screen face to prevent excessive exposure time. The need for intermediate bypasses shall be decided on a case-by-case basis.

3. Canals:

Where installation of fish screens at the diversion entrance is undesirable or impractical, the screens may be installed at a suitable location downstream of the canal entrance. All screens downstream of the diversion entrance shall provide an effective juvenile bypass system- designed to collect juvenile fish and safely transport them back to the river with minimum delay. The angle of the screen to flow should be adequate to effectively guide fish to the bypass. Juvenile bypass systems are part of the overall screen system and must be accepted by NMFS.

4. Lakes, Reservoirs, and Tidal Areas:

a. Where possible, intakes should be located off shore to minimize fish contact with the facility. Water velocity from any direction toward the screen shall not exceed the allowable approach velocity. Where possible, locate intakes where sufficient sweeping velocity exists. This minimizes sediment accumulation in and around the screen, facilitates debris removal, and encourages fish movement away from the screen face.

b. If a screened intake is used to route fish past a dam, the intake shall be designed to withdraw water from the most appropriate elevation in order to provide the best juvenile fish attraction to the bypass channel as well as to achieve appropriate water temperature control downstream. The entire range of forebay fluctuations shall be accommodated by the design, unless otherwise approved by NMFS.

B. Approach Velocity

Definition: *Approach Velocity* is the water velocity vector component perpendicular to the screen face.

Approach velocity shall be measured approximately three inches in front of the screen surface.

1. Fry Criteria - less than 2.36 inches {60 millimeters (mm)} in length.

If a biological justification cannot demonstrate the absence of fry-sized salmonids in the vicinity of the screen, fry will be assumed present and the following criteria apply:

Design approach velocity shall not exceed-

Streams and Rivers: 0.33 feet per second

Canals: 0.40 feet per second

Lakes, Reservoirs, Tidal: 0.33 feet per second (salmonids) (2)

2. Fingerling Criteria - 2.36 inches {60 mm} and longer

If biological justification can demonstrate the absence of fry-sized salmonids in the vicinity of the screen, the following criteria apply:

Design approach velocity shall not exceed -

All locations: 0.8 feet per second

3. The total submerged screen area required (excluding area of structural components) is calculated by dividing the maximum
diverted flow by the allowable approach velocity. (Also see Section K, Modified Criteria for Small Screens, part 1).

4. The screen design must provide for uniform flow distribution over the surface of the screen, thereby minimizing approach velocity. This may be accomplished by providing adjustable porosity control on the downstream side of the screens, unless it can be shown unequivocally (such as with a physical hydraulic model study) that localized areas of high velocity can be avoided at all flows.

C. Sweeping Velocity

Definition: *Sweeping Velocity* is the water velocity vector component parallel and adjacent to the screen face.

1. Sweeping Velocity shall be greater than approach velocity. For canal installations, this is accomplished by angling screen face less than 45 relative to flow (see Section K, Modified Criteria for Small Screens). This angle may be dictated by specific canal geometry, or hydraulic and sediment conditions.

D. Screen Face Material

1. Fry criteria

If a biological justification cannot demonstrate the absence of fry-sized salmonids in the vicinity of the screen, fry will be assumed present and the following criteria apply for screen material:

a. Perforated plate: screen openings shall not exceed 3/32 inches (2.38 mm), measured in diameter.

b. Profile bar: screen openings shall not exceed 0.0689 inches (1.75 mm) in width.

c. Woven wire: screen openings shall not exceed 3/32 inches (2.38 mm), measured diagonally. (e.g.: 6-14 mesh)

d. Screen material shall provide a minimum of 27% open area.

2. Fingerling Criteria

If biological justification can demonstrate the absence of fry-sized salmonids in the vicinity of the screen, the following criteria apply for screen material:

a. Perforated plate: Screen openings shall not exceed 1/4 inch (6.35 mm) in diameter.

b. Profile bar: screen openings shall not exceed 1/4 inch (6.35 mm) in width

c. Woven wire: Screen openings shall not exceed 1/4 inch (6.35 mm) in the narrow direction

d. Screen material shall provide a minimum of 40% open area.

3. The screen material shall be corrosion resistant and sufficiently durable to maintain a smooth and uniform surface with long term use.

E. Civil Works and Structural Features

1. The face of all screen surfaces shall be placed flush with any adjacent screen bay, pier noses, and walls, allowing fish unimpeded movement parallel to the screen face and ready access to bypass routes.

2. Structural features shall be provided to protect the integrity of the fish screens from large debris. Trash racks, log booms, sediment sluices, or other measures may be needed. A reliable on-going preventive maintenance and repair program is necessary to ensure facilities are kept free of debris and the screen mesh, seals, drive units, and other components are functioning correctly.

3. Screens located in canals - surfaces shall be constructed at an angle to the approaching flow, with the downstream end terminating at the bypass system entrance.

4. The civil works design shall attempt to eliminate undesirable hydraulic effects (e.g.- eddies, stagnant flow zones) that may delay or injure fish, or provide predator opportunities. Upstream training wall(s), or some acceptable variation thereof, shall be utilized to control hydraulic conditions and define the angle of flow to the screen face. Large facilities may require hydraulic

monitoring to identify and correct areas of concern.

F. Juvenile Bypass System Layout

Juvenile bypass systems are water channels which transport juvenile fish from the face of a screen to a relatively safe location in the main migratory route of the river or stream. Juvenile bypass systems are necessary for screens located in canals because anadromous fish must be routed back to their main migratory route. For other screen locations and configurations, NMFS accepts the option which, in its judgement, provides the highest degree of fish protection given existing site and project constraints.

1. The screen and bypass shall work in tandem to move out-migrating salmonids (including adults) to the bypass outfall with minimum injury or delay. Bypass entrance(s) shall be designed such that out-migrants can easily locate and enter them. Screens installed in canal diversions shall be constructed with the downstream end of the screen terminating at a bypass entrance. Multiple bypass entrances (intermediate bypasses) shall be employed if the sweeping velocity will not move fish to the bypass within 60 seconds (3) assuming the fish are transported at this velocity. Exceptions will be made for sites without satisfactory hydraulic conditions, or for screens built on river banks with satisfactory river conditions.

2. All components of the bypass system, from entrance to outfall, shall be of sufficient hydraulic capacity to minimize the potential for debris blockage.

3. To improve bypass collection efficiency for a single bank of vertically oriented screens, a bypass training wall may be located at an angle to the screens.

4. In cases where insufficient flow is available to satisfy hydraulic requirements at the main bypass entrance(s), a secondary screen may be required. Located in the main screen's bypass channel, a secondary screen allows the prescribed bypass flow to be used to effectively attract fish into the bypass entrance(s) while allowing all but a reduced residual bypass flow to be routed back (by pump or gravity) for the primary diversion use. The residual bypass flow (not passing through the secondary screen) then conveys fish to the bypass outfall location or other destination.

5. Access is required at locations in the bypass system where debris accumulation may occur.

6. The screen civil works floor shall allow fish to be routed to the river safely in the event the canal is dewatered. This may entail a sumped drain with a small gate and drain pipe, or similar provisions.

G. Bypass Entrance

1. Each bypass entrance shall be provided with independent flow control, acceptable to NMFS.

2. Bypass entrance velocity must equal or exceed the maximum velocity vector resultant along the screen, upstream of the entrance. A gradual and efficient acceleration into the bypass is required to minimize delay of out-migrants.

3. Ambient lighting conditions are required from the bypass entrance to the bypass flow control.

4. The bypass entrance must extend from floor to water surface.

H. Bypass Conduit Design

1. Smooth interior pipe surfaces and conduit joints shall be required to minimize turbulence, debris accumulation, and the risk of injury to juvenile fish. Surface smoothness must be acceptable to the NMFS.

2. Fish shall not free-fall within a confined shaft in a bypass system.

3. Fish shall not be pumped within the bypass system.

4. Pressure in the bypass pipe shall be equal to or above atmospheric pressure.

5. Extreme bends shall be avoided in the pipe layout to avoid excessive physical contact between small fish and hard surfaces and to minimize debris clogging . Bypass pipe centerline radius of curvature (R/D) shall be 5 or greater. Greater R/D may be required for supercritical velocities.

6. Bypass pipes or open channels shall be designed to minimize debris clogging and sediment deposition and to facilitate cleaning. Pipe diameter shall be 24 inches (0.610 m) or greater and pipe velocity shall be 2.0 fps (0.610 mps) or greater, unless otherwise approved by NMFS. (See Modified Criteria for Small Screens) for the entire operational range.

7. No closure valves are allowed within bypass pipes.

8. Depth of flow in a bypass conduit shall be 0.75 ft. (0.23 m) or greater, unless otherwise authorized by NMFS (See Modified Criteria for Small Screens).

9. Bypass system sampling stations shall not impair normal operation of the screen facility.

10. No hydraulic jumps should exist within the bypass system.

I. Bypass Outfall

1. Ambient river velocities at bypass outfalls should be greater than 4.0 fps (1.2 mps), or as close as obtainable.

2. Bypass outfalls shall be located and designed to minimize avian and aquatic predation in areas free of eddies, reverse flow, or known predator habitat.

3. Bypass outfalls shall be located where there is sufficient depth (depending on the impact velocity and quantity of bypass flow) to avoid fish injuries at all river and bypass flows.

4. Impact velocity (including vertical and horizontal components) shall not exceed 25.0 fps (7.6 mps).

5. Bypass outfall discharges shall be designed to avoid adult attraction or jumping injuries.

J. Operations and Maintenance

1. Fish Screens shall be automatically cleaned as frequently as necessary to prevent accumulation of debris. The cleaning system and protocol must be effective, reliable, and satisfactory to NMFS. Proven cleaning technologies are preferred.

2. Open channel intakes shall include a trash rack in the screen facility design which shall be kept free of debris. In certain cases, a satisfactory profile bar screen design can substitute for a trash rack.

3. The head differential to trigger screen cleaning for intermittent type systems shall be a maximum of 0.1 feet (.03 m), unless otherwise agreed to by NMFS.

4. The completed screen and bypass facility shall be made available for inspection by NMFS, to verify compliance with design and operational criteria.

5. Screen and bypass facilities shall be evaluated for biological effectiveness and to verify that hydraulic design objectives are achieved.

K. Modified Criteria for Small Screens (Diversion Flow less than 40 cfs)

The following criteria vary from the standard screen criteria listed above. These criteria specifically apply to lower flow, surface-oriented screens (e.g.- small rotating drum screens). Forty cfs is the approximate cut off; however, some smaller diversions may be required to apply the general criteria listed above, while some larger diversions may be allowed to use the "small screen" criteria below. NMFS will decide on a case-by-case basis depending on site constraints.

1. The required screen area is a function of the approach velocity listed in Section B, Approach

Velocity, Parts 1, 2, and 3 above. Note that "maximum" refers to the greatest flow diverted, not necessarily the water right.

2. Screen Orientation:

a. For screen lengths six feet or less, screen orientation may be angled perpendicular to the flow.

b. For screen lengths greater than six feet, screen-to-flow angle must be less than 45 degrees. (See Section C Sweeping Velocity, part 1).

c. For drum screens, design submergence shall be 75% of drum diameter. Submergence shall not exceed 85%, nor be less than 65% of drum diameter.

d. Minimum bypass pipe diameter shall be 10 in (25.4 cm), unless otherwise approved by NMFS.

e. Minimum pipe depth is 1.8 in (4.6 cm) and is controlled by designing the pipe gradient for minimum bypass flow.

Questions concerning this document can be directed to NMFS Hydraulic Engineering Staff at:

National Marine Fisheries Service
Southwest Region
777 Sonoma Ave. Room 325
Santa Rosa, CA 95402
Phone: 707-575-6050

Adopted: February 24, 1997

Authorizing Signature:

1. Adapted from NMFS, Northwest Region

2. Other species may require different approach velocity standards, e.g.- in California, the U.S. Fish & Wildlife Service requires 0.2 fps approach velocity where delta smelt are present in the tidal areas of the San Francisco Bay estuary.

3. In California, 60 second exposure time applies to screens in canals, using a 0.4 fps approach velocity. Where more conservative approach velocities are used, longer exposure times may be approved on a case-by-case basis, and exceptions to established criteria shall be treated as variances.

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)

ESSENTIAL FISH HABITAT CONSERVATION RECOMMENDATIONS[1]

Banta-Carbona Irrigation District
Fish Screen Project

I. IDENTIFICATION OF ESSENTIAL FISH HABITAT

The geographic extent of freshwater essential fish habitat (EFH) for the Pacific salmon fishery is proposed as waters currently or historically accessible to salmon within specific U. S. Geological Survey hydrologic units (Pacific Fisheries Management Council, 1999). For the San Joaquin River, the aquatic areas that may be identified as EFH for salmon are within the hydrologic unit map numbered 18050002 (titled: Mid. San Joaquin - L. Merced - L. Stanislaus).

Historically, the San Joaquin River, and its principal tributaries, the Merced, Tuolumne, and Stanislaus Rivers, once supported spring and fall runs of chinook salmon (*Oncorhynchus tshawytscha*) (Reynolds et al. 1993). The spring run, formerly the most abundant salmon in the San Joaquin system, was extirpated by 1942 because of dam construction that blocked access to cold-water habitat upstream (Yoshiyama et al., 1996; 2000). The fall run has been reduced to a small remnant in the tributaries. In 1992, only 1,250 adults returned upstream to spawn including returns to a hatchery on the Merced River (Kondolf et al., 1996b). Recent estimates find that fall-run chinook have declined between 85 percent to 90 percent (Rich and Loudermilk, 1991; USFWS, 1995) from the population levels which existed in the 1940's. Fall-run chinook spawning population estimates from the Stanislaus, Tuolumne and Merced Rivers from 1974 to 1991 show both rising and descending trends lasting for several years(Kano, 1996; 1998). Factors limiting salmon populations in these rivers include low instream flows, high water temperature, reversed flows in the Delta (drawing juveniles into large diversion pumps), loss of fish into unscreened agricultural diversions, predation (especially by warm-water fish species), and lack of rearing habitat (Kondolf et al., 1996a; 1996b). In the rivers, predation on outmigrating juveniles by exotic species (centrarchid basses) can be a major problem in the lower reaches (Hatton, 1940; USFWS, 1995). When flows increase, migration time is more rapid and water clarity and temperatures are lower, which decrease the effectiveness of predators (USFWS, 1995). Outmigrating fall-run chinook range in size between 2.3 - 4.3 (60- 110 mm) inches based on a sampling station located downstream of the action area (S. Baumgautner, CDFG, pers. comm., 5/12/00).

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[1]The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) set forth new mandates for the National Marine Fisheries Service (NMFS) and federal action agencies to protect important marine and anadromous fish habitat. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to NMFS' "EFH Conservation Recommendations." The Pacific Fisheries Management Council has identified essential fish habitat (EFH) for the Pacific salmon fishery in Amendment 14 to the Pacific Coast Salmon Fishery Management Plan.

Life History and Habitat Requirements

General life history information for chinook salmon is summarized below. Further detailed information on chinook salmon ESUs are available in the NMFS status review of chinook salmon from Washington, Idaho, Oregon, and California (Myers et al., 1998), and the NMFS proposed rule for listing several ESUs of chinook salmon (NMFS, 1998).

Central Valley fall-run chinook enter the Sacramento and San Joaquin Rivers from July through April and spawn from October through December (USFWS, 1998) although San Joaquin River populations tend to spawn later in the year than Sacramento River populations (Myers et al. 1998). Peak spawning occurs in October and November (Reynolds et al., 1993). Chinook salmon spawning generally occurs in swift, relatively shallow riffles or along the edges of fast runs at depths greater than 6 inches, usually 1-3 feet to 10-15 feet. Preferred spawning substrate is clean loose gravel and gravels are unsuitable when they have been cemented with clay or fines or when sediments settle out onto redds reducing intergravel percolation (NMFS, 1997).

Egg incubation occurs from October through March, and juvenile rearing and smolt emigration occurs from January through June (Reynolds et. al., 1993). At the time of emergence from their gravel nests, most fry disperse downstream towards the estuary shortly after they emerge or as smolts (Kjelson et al., 1982), hiding in the gravel or stationing in calm, shallow waters with fine sediments substrate and bank cover such as tree roots, logs, and submerged or overhead vegetation. Juvenile rearing occurs from January through mid May and the smaller fry inhabit marginal areas of the river, particularly in back eddies, behind fallen trees, near undercut tree roots or over areas of bank cover (Lister and Genoe, 1970). Juvenile emigration occurs from mid March through mid June. Chinook fry prefer slower velocity streambank areas and orient upstream to the current as opposed to the smolt stage that swims downstream with the current (Schaffter, 1980). As they grow, the juveniles associate with coarser substrates along the stream margin or farther from shore (Healey, 1991). Along the emigration route, submerged and overhead cover in the form of rocks, submerged aquatic vegetation, logs, riparian vegetation, and undercut banks provide food, shade and protect juveniles from predation.

Principal foods of chinook while rearing in freshwater and estuarine environments are larval and adult insects and zooplankton such as *Daphnia,* flys, gnats, mosquitoes or copepods (Kjelson et al. 1982), stonefly nymphs or beetle larvae (Chapman and Quistdorff 1938) as well as other estuarine and freshwater invertebrates.

II. PROPOSED ACTION.

The proposed action is described in Part II of the associated Biological Opinion for the threatened Cental Valley Steelhead ESU.

III. EFFECTS OF THE PROJECT ACTION

As fall-run chinook fry begin their downstream in the San Joaquin River towards the Sacramento-San Joaquin Delta in the spring months, their feeding and migratory requirements are met by the EFH of the San Joaquin River. The presence and operation of Banta Carbona Irrigation District's (BCID) diversion canal can interrupt both of these EFH habitat functions if downstream migrants veer from the river itself into the diversion canal. Because the smaller downstream migrants tend to inhabit the marginal areas of the river rather than the higher velocity areas midstream, the likelihood of fry deviating from the river channel and entering the diversion canal is high. Should these fry be entrained through the fish-screen/bypass facility, their feeding behavior may be temporarily interrupted and their migratory pathway becomes extraordinarily complicated.

Movements of fall-run chinook fry into the diversion canal and through the fish-screen/bypass facility may also reduce their cover should predatory fish congregate in the diversion canal or at the terminus of the bypass pipe. Kondolf et. al. (1996a) notes that warm-water predators tend to concentrate around artificial structures such as irrigation diversion structures. Chances for predation are magnified should chinook salmon fry be discharged in a stressed or disoriented condition that precludes escape. A congregation of predators as a result of the diversion structure may affect EFH quality for all juvenile chinook migrating through the area.

IV. CONCLUSION

Upon review of the effects of the fish-screen/bypass facility, NMFS believes that while the project action, as proposed, will contribute greatly to the reduced entrainment of fall-run chinook fry, the operation of the facility still imposes an adverse affect on the potential EFH of fall-run chinook in the project area of the San Joaquin River.

V. EFH CONSERVATION RECOMMENDATIONS

NMFS recommends that Reasonable and Prudent Measures Nos. 1, 2, 3, 4 and 5 and their respective Terms and Conditions listed in the Incidental Take Statement prepared for the Central Valley Steelhead ESU in the associated Biological Opinion be adopted as EFH Conservation Recommendations. In addition, one additional EFH Conservation Recommendation is provided for future conservation and enhancement of EFH for juvenile fall-run chinook. These recommendations are provided as advisory measures.

1. BOR and BCID shall ensure that the fish-screen/bypass system is operated and maintained in a manner consistent with NMFS-approved fish screening criteria for anadromous salmonids (see Attachment A).

> A. BOR and BCID should incorporate design criteria consistent with the fish screening guidelines and criteria guidelines promulgated by NMFS, Southwest Region to avoid and minimize direct mortality resulting from entrainment and predation during BCID diversions.

B. BOR and BCID should develop a proposed operations and maintenance plan for the fish-screen/bypass facility. The plan should address periodic underwater inspections, period assessment of screen physical performance and shall detail routine and emergency operations and maintenance including the replacement and repair of screens and other components of the facility. This plan should be submitted to NMFS for review and approval before diversion operations begin. NMFS shall provide in writing either concurrence with the plan or notification to BOR and BCID that plan modifications are necessary for acceptance.

C. BCID should curtail all diversion from the San Joaquin River when any portion of the fish screen structure is damaged or removed for maintenance or repair which allows unscreened water to pass.

D. An operations and maintenance log book should be maintained on a daily basis. The log book shall be made available for inspection to NMFS personnel with 24 hours notice.

E. NMFS staff, including diving personnel, should be granted access to the site for inspection and measurement of fish screen performance and bypass outfall conditions. NMFS will provide a minimum of 48 hours advance notice to BOR and BCID for requesting access.

2. BOR and BCID should ensure that the fish-screen/bypass facility is adequately evaluated to ensure optimum biological performance for fish passage and their safe return to the San Joaquin River.

A. BOR and BCID should develop a Fish Protection and Evaluation/Monitoring Plan designed to evaluate and monitor the biological efficacy of the fish-screen/bypass system. The Plan should describe studies used to evaluate fish-screen/bypass performance including: mechanical systems, fish entrainment, juvenile fish bypass, fish screen hydraulics and predation. The Plan should provide measurable objectives, indicators of performance in meeting these objectives, and suggested measures for improving the biological efficacy of the fish-screen/bypass system if objectives are not met. This Plan should be submitted to NMFS for review and approval before diversion operations begin by December 31, 2000. NMFS shall provide in writing either concurrence with the plan or notification to BOR and BCID that plan modifications are necessary for acceptance.

B. BOR and BCID should immediately evaluate the biological efficacy of the fish-screen/bypass system once operations begin as outlined in the evaluation plan using test fish to determine if measurable objectives set to evaluate the performance of the screens, fish pumps and bypass system have been met.

3. BOR and BCID should monitor the construction area and implement adequate control measures to avoid or minimize sediment, turbidity and pollutant inputs to the San Joaquin River during construction and intake canal maintenance operations.

A. At the time of the project action, BOR and BCID should prepare and implement a Water Pollution Plan to avoid or minimize increased sediment and turbidity impacts. This plan should include designating an erosion control specialist. The specialist should demonstrate adequate experience in the field of erosion and sedimentation control and shall have authority to oversee and direct the implementation of this plan and placement and application of erosion control and sediment detention devices during the project action and afterwards if necessary.

B. Erosion control and sediment detention devices should be incorporated into the project and implemented at the time of the project action. These devices should be in place during the project action, and after if necessary, for the purpose of minimizing fine sediment and sediment/water slurry input to flowing water. The devices should be placed at all locations where the likelihood of sediment input exists.

C. At the time of the project action, BOR and BCID should prepare and implement a Storm Water Pollution Prevention Plan as part of the National Pollutant Discharge Elimination System (NPDES) General Construction Activity Storm Water Permit to avoid or minimize increased sediment and turbidity impacts. These plans will be reviewed and approved by NMFS.

D. At the time of the project action, BOR and BCID should prepare and implement a Toxic Material Control and Spill Response Plan to avoid or minimize increased pollutant inputs. These plans will be reviewed and approved by NMFS.

E. BOR and BCID should isolate each workspace for the purpose of avoiding sedimentation, turbidity, and direct effects to chinook salmon. Prior to construction activities, diversion materials should be installed (e.g., sandbag cofferdams, straw bales) to divert streamflow away or around each workspace. The diversion should remain in place during the project, then removed immediately after work is completed.

4.   BOR and BCID should prepare and submit monitoring reports prepared to document efficiency of fish-screen/bypass system operations.

A. BOR and BCID should provide a written monitoring report to NMFS within 30 working days following completion construction. The report should include the number of chinook killed or injured during the project action and biological monitoring; the number and size of chinook ; and, any effect of the project action on chinook not previously considered.

B. BOR and BCID should prepare a written report describing results of their Evaluation Plan to NMFS on a schedule that is developed in the Evaluation Plan.

C. All reports, proposed plans, and annual updates should be submitted to: Mr. Michael Aceituno, Protected Resources Division, NMFS, 650 Capitol Mall, Suite 6070, Sacramento, California 95814, (916) 498-6498, Fax (916) 498-6697.

5. BOR and BCID shall insure that no additional shelter or quiet areas (e.g., accumulation of woody debris, scour depressions in the river bottom etc.) used by predatory fishes will be created at the intake canal and the area of the bypass outlet.

A. BOR and BCID shall periodically inspect the diversion canal and the bypass terminus to insure that favorable habitat conditions (e.g., scour areas, debris accumulations etc.) that allow for predatory fishes to assemble have not been created.

B. BOR and BCID shall take measures to remove favorable habitat conditions for predatory fishes at the diversion canal or bypass terminus identified during inspections.

6. BOR and BCID should provide information to NMFS on the various biological benefits of their fish-screen/bypass facility so that NMFS, BOR and BCID can use that information in developing outreach to the owners and operators of other unscreened diversions in the San Joaquin River Basin with the goal of providing addition protection to fall-run chinook.

VI. BUREAU OF RECLAMATION'S STATUTORY REQUIREMENTS

Section 305(b)(4)(B) of the Magnuson-Steven Act and Federal regulations (50 CFR Sections 600.920) to implement the EFH provisions of the Magnuson-Stevens Act require federal action agencies to provide a written detailed response to NMFS' EFH Conservation Recommendations within 30 days of receipt. The response must include a description of measures adopted by BOR for avoiding, mitigating, or offsetting the impact of the project on EFH. In the case of a response that is inconsistent with NMFS' recommendations, BOR must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(j)).

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